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Final

Transportation and Disposal Feasibility Study Technical Memorandum

Cornell-Dubilier Electronics Superfund Site, South Plainfield, NJ

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CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
FINAL TRANSPORTATION AND DISPOSAL
FEASIBILITY STUDY TECHNICAL MEMORANDUM
FOR OPERABLE UNIT 2 (OU-2)

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1.0 PURPOSE AND SCOPE

The Cornell-Dubilier Electronics Superfund Site (the Site) is located at 333 Hamilton Boulevard, South Plainfield, Middlesex County, New Jersey. The U.S. Environmental Protection Agency (USEPA) assigned EPA ID# NJD981557879 to the Site for identification purposes. The Site's history and information on previous site investigations are summarized in the Remedial Investigation/Feasibility Report (RI/FS). The approach for this evaluation is outlined in the approved Transportation and Disposal (T&D) Feasibility Study Work Plan.

The purpose of this technical memorandum is to summarize the results of the T&D evaluation and recommendations for an approach to transportation and disposal of material containing PCBs greater than 500 ppm and material exceeding the New Jersey Impact to Groundwater Soil Clean up Criteria (IGSCC), as required under the OU-2 scope of work described in the Record of Decision (ROD). Included is information on volume estimates, material characterization assumptions, coordination issues with railroad companies and their affiliates, transportation costs by rail (direct access and truck to rail intermodal access) and by conventional trucking, as well as disposal facility options and costs. Recommendations for transportation and disposal are also provided.

2.0 VOLUME ESTIMATES AND MATERIAL CLASSIFICATIONS

In order to evaluate T&D options, baseline assumptions were made on excavation volumes and anticipated material classifications. The OU-2 scope of work calls for the excavation of soils containing PCB concentrations greater than 500 ppm and soils exceeding the New Jersey Department of Environmental Protection (NJDEP) Impact to Groundwater Soil Cleanup Criteria (IGWSCC). The PCB contaminated soil will either be treated on-site for PCBs and re-used as backfill or hauled off-site for disposal.

Figures 1 through 3 illustrate potential extents of contamination for three depth intervals (0-2 feet, 2-6 feet, and 6-14 feet) based on sampling data presented in the RI/FS as collected by Foster-Wheeler in 2002 and by the EPA in 1996. The data were used to estimate the potential extents of excavation both horizontally and vertically and to identify/estimate material classifications which may be encountered on Site.

2.1. EXCAVATION VOLUMES

The RI/FS volume estimate of 107,000 cubic yards of soil requiring excavation for the removal of PCB concentrations > 500 ppm was based on a spatial averaging of sampling data provided by Foster-Wheeler and USEPA as shown on Figures 1 through 3. An 8.6 foot excavation depth throughout the developed portion of the Site and a 14.3 foot excavation depth throughout the undeveloped portion of the Site were assumed. As part of this transportation and disposal study, additional RI/FS data evaluation was required to estimate what percentage of the excavated soil (PCBs >500 ppm) has the potential to be characterized as mixed RCRA material in order to identify disposal facility options. While reviewing the non-PCB data, incidental analysis of the existing PCB data was also conducted in order to calculate a more conservative (i.e., lower) excavation volume which was then used in calculating conservative (i.e., higher) rail spur unit capital costs. The delineation between points is considered approximate. A traditional interpolation or kriging method was not used for this evaluation; only a rough approximation of the extent of contamination between "hot" and "cold" points was made. A more comprehensive delineation will be performed for the design once the PDI work is completed. This additional data evaluation resulted in an estimate of approximately 33,500 in place cubic yards of contaminated soil based on RI/FS data requiring excavation and the delineation of these areas above 500 ppm are shown on Figures 1 though 3, identified in red as "MPI Delineation of PCBs > 500 ppm". There are isolated areas, specifically in the southeast, where no data is available; contaminated material may be present in these areas. Therefore, a volume increase of approximately 30% (resulting in a total of approximately 43,800 in-place cubic yards) was added to account for anticipated volume growth as a result of the pending pre-design investigation (PDI) sampling event.

This volume estimate is considered conservative and was used for the purpose of this T&D study because a lower transportation volume will provide a higher capital cost per ton ($/ton) for direct rail; and, therefore provide a more conservative overall cost benefit value, if any, for direct rail. An increase in the volume of soil hauled off-site would lower the capital cost portion of the direct rail cost and ultimately lower the overall transportation cost per ton. A more definitive volume estimate will be calculated once the PDI work is completed and the data evaluated; the 43,800 cy volume used in this study should be considered conservative and preliminary at this time.

2.2. MATERIAL CLASSIFICATIONS – TSCA, RCRA, AND MIXED WASTE

Based on the Toxicity Substance Control Act (TSCA), soil with PCB contamination greater than 50 ppm must be characterized as TSCA waste and must be disposed of at a TSCA permitted facility. Therefore, any soil excavated from the Site with the exception of an anticipated small volume of soil outside the PCB > 500 ppm delineation that will be excavated due to non-PCB IGWSCC exceedences will, at a minimum, be classified as a TSCA regulated waste. The portion of the excavated soil containing little or no debris will be thermally treated on-site to reduce the PCB concentration to below the EPA selected remediation goal for direct contact with soil of 10 ppm. The treated soil must meet all other IGWSCC standards prior to use as backfill on-site. Excavated soil containing large amounts of debris will not be treated on-site and will be transported off-site for disposal.

Site materials may also be characterized as hazardous under the Resource Conservation and Recovery Act (RCRA) and will be subject to additional regulatory requirements for disposal. Toxicity Characteristic Leaching Procedure (TCLP) data, which is used to characterize the Site soils as RCRA or non-RCRA, were not collected during the RI/FS and therefore were not available to evaluate the potential for the material to be classified as a RCRA characteristic hazardous waste. The 20 times rule is often used to estimate the potential for a waste material to be considered a TCLP characteristic hazardous waste. The 20 times rule is a conservative approach because it assumes 100% of the constituent of concern will leach under the TCLP Method. Soil with constituents of concern (COCs) exceeding the 20 times rule may or may not be a RCRA TCLP characteristic hazardous waste, but soils that do not exceed the 20 times rule cannot be a RCRA characteristic waste. For the purpose of this evaluation, we assumed that soil with COCs exceeding the 20 times rule will be a RCRA TCLP characteristic hazardous waste. The results of this evaluation are illustrated on Figures 1 through 3 as the blue cross-hatched areas. Figures 1 through 3 illustrate the approximate horizontal and vertical extent of the RCRA and TSCA characteristic waste and where the two waste classes appear to overlap indicating the potential for mixed waste requiring off-site disposal. Table 1.0 summarizes the volume estimates for the anticipated waste classifications. Again, all volume estimates are considered approximate and are expected to be revised during the design phase.

TABLE 1.0

In-Place Volume Estimates Based on RI Data and Anticipated PDI Data Results

Waste Classification	0-2 feet	2-6 feet	6-14 feet
PCBs > 500 ppm (TSCA)	4,100 CY	6,900 CY	3,300 CY
Mixed (RCRA and TSCA)	12,900 CY	15,100 CY	1,300 CY
IGWSCC (non-RCRA)	200 CY	0 CY	0 CY
Total Excavation Volume	17,200 CY	22,000 CY	4,600CY
		Total	43,800CY

2.3. OFF-SITE TREATMENT AND DISPOSAL EVALUATION

Three major waste classifications (i.e., TSCA, RCRA, and TSCA/RCRA mixed) will require off site disposal in order to comply with the ROD. Further characterization and evaluation of the Site materials related to metals, organics, and PCB concentrations will be required to determine if pre-treatment at the RCRA regulated disposal facility is required to comply with RCRA Land Disposal Restrictions (LDRs) contained in 40 CFR 268.

The existing Site soil characteristic data indicates the Site contains materials classified as a RCRA characteristic waste for organics, metals, or both organics and metals. The LDRs require that hazardous constituent concentrations meet the Treatment Standards identified in the Table entitled "Treatment Standards for Hazardous Wastes" in 40 CFR 268.40 in order to be directly disposed into a RCRA landfill. If the Treatment Standards are not met, then the soils require treatment prior to disposal.

The Treatment Standards for characteristic wastes require each hazardous constituent to meet their respective concentrations listed in the 40 CFR 268.48 standards. The 40 CFR 268.48 standards require that all underlying hazardous constituents (UHCs) meet the Universal Treatment Standards (UTS) listed in Table UTS. The UHCs are defined as "any constituent listed in 40 CFR 268.48, Table UTS except fluoride, selenium, sulfides, vanadium, and zinc, which can be reasonably expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards."

If any UHCs exceed the UTS, then the soil has to be treated to concentrations that achieve 90% reduction or are below ten times the UTS, whichever is greater (this is typically referred to as 90% capped by 10xUTS). Therefore, a UHC only requires treatment if the concentration is greater than ten times the UTS.

PCBs are listed as a UHC subject to the universal treatment standards of RCRA. The non-wastewater UTS for total PCBs is 10 mg/kg[3] (10 ppm). The UTS limit creates a disparity between RCRA regulations and TSCA regulations, because TSCA does not restrict the concentrations of PCBs for land disposal. Effective December 26, 2000 the EPA issued a deferral for the treatment of PCBs as a UHC in soil exhibiting a hazardous characteristic for metals. The deferral allows soil containing PCBs and exhibiting the toxicity characteristic solely for metals to be land disposed provided the total concentration of halogenated organic compounds(HOCs), of which PCBs are included, are less than 1,000 ppm and the LDRs of all other UHCs have been attained. If the soils cannot comply with the LDR regulations, a treatment variance can be requested, a petition can be submitted, or the soils can be incinerated.

In order to help determine possible disposal facility options, sub material classifications were developed based on the LDRs. Figures 4 and 5 are flow charts that illustrate possible waste classifications with the estimated volumes for each. Assumptions based on data presented in the RI/FS were made in developing the flow charts. These assumptions were required to estimate the volume of material expected to have certain characteristics and associated disposal requirements. The assumed volumes are indicated on the Figures and summarized in Table 2.0.

TABLE 2.0

Volume Estimates of Potential Sub-Waste Classification Streams

Waste Characterization	Volume
Re-use as Backfill On-Site	6,240 CY
RCRA Regulated meets LDRs	7,830 CY
RCRA Regulated does not meet LDRs	7,830 CY
TSCA Only	6,550 CY
TSCA/RCRA mixed – meets LDRs	3,070 CY
TSCA/RCRA mixed – does not meet LDRs for metals (PCBs > 1,000 ppm)	6,450 CY
TSCA/RCRA mixed – does not meet LDRs for metals and organics (PCBs <100)	0 CY
TSCA/RCRA mixed – does not meet LDRs for metals (PCBs <100)	2,150 CY
TSCA/RCRA mixed – does not meet LDRs for metals and organics (PCBs > 1,000 ppm)	3,680 CY
TOTAL	**43,800 CY**

Note: For the purpose of estimating transportation costs, we have assumed that all soil except for the estimated 6,240 CY of soil to be re-used as backfill will require off-site disposal, which equates to approximately 37,560 CY.

2.3.1. PCB Off-Site Disposal Volume Assumptions

Per the ROD, soil containing PCBs greater than 500 ppm is to be excavated. The portion of excavated soil with large amounts of debris is to be disposed of off-site. The total volume of soil used in these assumptions was further divided into sub-classifications using the following assumptions:

- 50 percent (%) of excavated soil contains debris and will not be treated on-site (21,900 in place cubic yards). This assumption is stated in the ROD.
- Of the 21,900 CY for off-site disposal, 30% is assumed to be TSCA regulated only (6,550CY) and the remaining 70% (15,350CY) is assumed to be mixed TSCA/RCRA regulated waste. This assumption is based on the delineations illustrated on Figures 1 through 3 and the volumes summarized in Table 1.0.

- Of the 15,350 CY of mixed waste, 70% is assumed to be RCRA TCLP characteristic for metals (10,750 CY), 30% is assumed to be RCRA TCLP characteristic for metals and organics (4,600 CY), and none is assumed to be RCRA characteristic for organics only. Existing data indicates that the majority of the RCRA TCLP characteristic soil is characteristic for metals.
- Of the 10,750 CY of mixed waste characteristic for metals, 80% does not meet the LDRs (8,600 CY) and 20% does meet the LDRs (2,150 CY). This assumption is based on the high concentrations of PCBs (PCBs > 1,000 ppm) reported in the RI/FS data. Additional characterization is required to confirm this assumption.
- Of the estimated 8,600 CY of mixed waste characteristic for metals not meeting the LDRs, 75% have PCBs greater than 1,000 ppm (6,450 CY) and 25% have PCBs less than 1,000 ppm (2,150 CY). *Based on disposal facility research, there is only one disposal facility (Andrew, TX) that is capable of accepting mixed waste RCRA characteristic for metals with PCBs exceeding 1,000 ppm.*
- Of the estimated 4,600 CY of mixed waste characteristic for metals and organics, 80% does not meet the LDRs (3,680 CY) and 20% does meet the LDRs (920 CY). Additional characterization is required to confirm this assumption.
- Of the estimated 3,680 CY of mixed waste characteristic for metals and organics, 100% have PCBs greater than 100 ppm (3,680 CY) and none is assumed to have PCBs less than 100 ppm. Based on disposal facility research, there is only one disposal facility (Andrew, TX) that is capable of treating mixed waste characteristic for metals with PCBs exceeding 1,000 ppm.

2.3.2. PCB On-Site Treatment Volume Assumption

The portion of excavated soil containing little or no debris will be treated on-site for PCBs and re-used as backfill. This material classification was further divided into sub-classifications based on the following assumptions developed using existing data in the RI/FS:

- 50 % of excavated soil contains little or no debris and will be treated on-site (~21,900 in place cubic yards).
- Of the 21,900 CY of treated soil, that 100% will be treated to PCBs <10ppm as specified in the ROD. We have assumed that the on-site treatment facility will continue to treat soil until it meets the performance

criteria of PCBs < 10 ppm. If treatment criteria changes and soil is only treated for a certain amount of time before it is shipped off-site, then this assumed volume will decrease and the volume of soil hauled off-site will increase.

- Of the 21,900 CY with PCBs < 10ppm, approximately 5% (1,100 CY) does not meet IGWSCC (all of which is RCRA TCLP characteristic for metals) for other constituents and 95% (20,800 CY) does meet IGWSCC. This assumption is based on the existing data in the RI/FS.
- Of the 20,800 CY treated soil, 30% non RCRA characteristic (6,240 CY) and can be re-used as backfill on-site; 70% is assumed to be RCRA characteristic waste (14,560 plus 1,100 CY = 15,660 CY). *This assumption is based on the understanding that RCRA TCLP characteristic waste cannot be used on-site even if it meets IGWSCC standards. An exemption to this requirement would reduce the remediation costs by reducing off-site disposal.*
- Of the 15,660 CY RCRA characteristic waste, 50% meets the LDRs (7,830 CY) and can be directly disposed of in a RCRA regulated landfill, and 50% does not meet the LDRs and requires pre-treatment (7,830 CY).
- Of the 7,830 CY RCRA characteristic soil exceeding the LDRs, 25% requires pre-treatment for metals and organics (2,000 CY) and 75% of the volume requires pre-treatment for metals only (5830 CY).

2.3.3. Impact to Groundwater Standard Cleanup Criteria Volume Assumption

Per the ROD, soil exceeding the New Jersey IGWSCC standards is to be excavated. Based on the RI/FS data, a portion of soil exceeding the New Jersey IGWSCC exists outside the PCB excavation limit and requires additional excavation. This requirement results in the waste classification illustrated on Figure 5. This material classification was divided into sub-classifications using the following assumptions:

- Based on evaluation of Figure 1, 1,700 CY of soil exceed the IGWSCC standards.
- 10 % of the 1,700 CY is not to be RCRA characteristic waste and can be disposed of at a Subtitle D Landfill (170 CY)
- 90% of the 1,700 CY is RCRA TCLP characteristic waste (1530 CY).

- Of the 1,530 CY RCRA TCLP characteristic waste, 60% does not meet the LDRs and requires pre-treatment prior to disposal (920 CY) and 40% meets the LDRs and does not require pre-treatment (610 CY).
- Of the 920 CY of RCRA TCLP characteristic waste exceeding LDRs, 50% is RCRA TCLP characteristic for metals (460 CY) and 50% is RCRA TCLP characteristic by metals and organics (460 CY).

2.3.4. Building Debris Volume Assumption

The selected remedy for the buildings as discussed in the ROD includes the demolition of the 18 buildings with a contingency remedy that would allow for the decontamination and surface encapsulation of certain building. The FS, however, based the remedy selection costs on the assumption that all buildings would be demolished. For the purposes of this evaluation, the following assumptions have been made based on the information included in the FS:

- The 18 buildings will be demolished.
- An estimated 29,000 tons of debris will be generated as a result of building demolitions.
- 25% of the building debris will be hazardous and the remaining 75% of the building debris will be non-hazardous.
- Due to elevated levels of PCBs and metals, the hazardous building debris will be RCRA and TSCA regulated requiring treatment.

Depending on the timing for building demolition, the quantities addressed here may be eligible for off-site transport using the selected mode of transport for the soils. *At this time, however, these volumes have not been factored into this evaluation.*

3.0 DISPOSAL FACILITY EVALUATION

Twenty-one facilities categorized as Subtitle C hazardous waste landfills and currently holding USEPA identification numbers are engaged in commercial disposal of RCRA Subtitle C hazardous waste according to a report titled "Report on Treatment, Storage & Disposal Facilities (TSDF) for Hazardous, Toxic, and Radioactive Waste (HTRW)", prepared for the U.S. Army Corps of Engineers. The report is posted on USACE website and is updated annually. Eight of the twenty-one operating commercial hazardous waste landfills identified hold a Toxic Substances Control Act (TSCA) permit for disposal of PCB-contaminated materials.

This section provides information on waste acceptance criteria and pre-treatment capabilities, rail car access, location, distance from the Site, and additional information obtained during disposal facility inquiries for seven of the eight operating commercial hazardous waste landfills identified as holding a TSCA permit for disposal of PCB-contaminated material. The eighth facility in Deer Park, TX operated by Clean Harbors only accepts material for incineration, therefore, is not applicable for this project. Although there is a potential for RCRA only characteristic waste to be hauled off-site, RCRA only Subtitle C hazardous waste landfills were not contacted for this T&D study and should be researched once T&D procurement begins.

3.1. ENVIRONMENTAL QUALITY (BELLEVILLE/DETROIT, MICHIGAN)

- Environmental Quality (EQ) operates a waste disposal facility in Belleville, Michigan that accepts RCRA, TSCA, and mixed waste with PCBs < 1,000 ppm.
- The facility is approximately 600 highway miles from the Site.
- The facility has on-site capabilities to pre-treat for RCRA metals and RCRA organics (chemical oxidation treatment system for organics treatment and microencapsulation for metals treatment) to meet LDRs, but cannot pre-treat mixed RCRA/TSCA waste.
- The facility can accept waste by intermodal containers off a flatbed rail car at a trans-load facility in Romulus, MI (approximately 15 miles away).

3.2. CLEAN HARBORS (GRASSY MOUNTAIN, UTAH)

- Clean Harbors operates a waste disposal facility in Grassy Mountain, Utah located approximately 2300 highway miles from the Site.
- The facility accepts RCRA, TSCA, mixed waste with PCBs < 1,000 ppm and can pre-treat RCRA waste to comply with LDRs for RCRA metals. They have limited capacity to treat organics and do not treat mixed waste to comply with LDRs.
- The facility accepts waste by either gondola rail car or intermodal flatbed rail car at a transload rail facility 2-3 miles from the disposal facility.

3.3. CHEMICAL WASTE MANAGEMENT (MODEL CITY, NEW YORK)

- Chemical Waste Management operates a waste disposal facility in Model City, New York, approximately 420 highway miles from the Site.
- The facility accepts RCRA, TSCA, and mixed waste with PCBs < 1,000 ppm and has on-site capabilities to treat mixed waste for RCRA metals only. The facility will only treat for metals if the total concentration of HOCs is less than 500 ppm, as well as other metals restrictions for treatment. The facility uses microencapsulation to treat for metals.
- The facility can perform microencapsulating for hazardous debris management.
- The facility does not have a rail spur and cannot therefore accept waste transported via gondola.
- Waste shipped by rail in intermodals would be transferred to trucks at the transload facility in Buffalo (approximately 17 miles from the facility) and then taken to the facility; however, this operation is currently not being implemented. Therefore, it is assumed that this facility does not accept waste by rail, either gondola rail car or flatbed rail car. Approximately 99.9% of the deliveries to the facility are by roll-offs or trucks.

3.4. CHEMICAL WASTE MANAGEMENT (EMELLE, ALABAMA)

- Chemical Waste Management operates a waste disposal facility in Emelle, Alabama, approximately 1100 highway miles from the Site.
- The facility accepts RCRA, TSCA, and mixed waste with PCBs <1,000 ppm.

- The facility has the on-site capabilities to treat mixed waste for RCRA metals and RCRA organics. The facility will only treat mixed TSCA and RCRA waste for metals if the concentration of PCBs is less than 500 ppm.
- The facility can perform microencapsulating for hazardous debris management.
- The facility can accept waste via gondola, truck or intermodals, but requires trans-loading approximately 15 miles off site.

3.5. CHEMICAL WASTE MANAGEMENT (ARLINGTON, OREGON)

- Chemical Waste Management operates a waste disposal facility in Arlington, Oregon, approximately 2800 highway miles from the Site.
- The facility accepts RCRA, TSCA, and mixed waste with PCBs < 1,000 ppm.
- The facility has the on-site capabilities to treat for RCRA metals and RCRA organics. The facility can not treat for RCRA organics if the waste is mixed with PCBs exceeding the TSCA limit. The facility can only treat mixed TSCA and RCRA waste for metals if the concentration of PCBs < 1,000 ppm.
- The facility has direct rail access on-site and can accept waste via gondola, truck or intermodals.

3.6. AMERICAN ECOLOGY (GRAND VIEW, IDAHO)

- American Ecology operates a waste disposal facility in Grand View, Idaho, approximately 2500 highway miles from the site.
- The facility accepts RCRA, TSCA, and mixed waste with PCBs < 1,000 ppm.
- The facility has the on-site capabilities to treat mixed waste for RCRA metals and RCRA organics. The facility can treat mixed waste for metals or organics only if the PCBs are <1,000 ppm.
- The facility can perform debris encapsulation for hazardous debris management.
- The facility can accept waste via gondola, truck or intermodals directly at the facility.

A Customer Service Manager (Jim Hancock) from American Ecology in Idaho stated that the facility is currently in the process of seeking a treatment variance from the USEPA for PCBs as a UHC. If the treatment variance is granted, the facility would then be able to accept and dispose of mixed RCRA and TSCA wastes and the PCBs would not be considered a UHC under the RCRA LDR restrictions. The facility would still be required to meet the treatment requirements for RCRA metals and RCRA organics; however, the allowable concentration of PCBs would be unlimited. The conversation with Jim Hancock took place on February 8, 2006; at that time he estimated the variance would take approximately 6 months for approval, if granted.

3.7. AMERICAN ECOLOGY (BEATTY, NEVADA)

- American Ecology operates a waste disposal facility in Beatty, Nevada, approximately 2700 highway miles from the Site.
- The facility accepts RCRA, TSCA, and mixed waste with PCBs < 1,000 ppm.
- The facility has the on-site capabilities to treat mixed RCRA organics and RCRA metals. The facility can treat mixed waste for metals and organics only if the PCBs are < 1,000 ppm.
- Does not have rail access capabilities for either intermodal flatbed rail cars or gondola rail cars; they accept waste only by truck.

3.8. WASTE CONTROL SPECIALISTS (ANDREWS, TEXAS)

- Waste Control Specialists operates a waste disposal facility in Andrews, Texas, which is approximately 1900 miles from the Site.
- The facility accepts RCRA, TSCA, and mixed waste with unlimited PCB concentrations and has on-site capabilities to pre-treat mixed waste for RCRA organics and metals to meet LDRs.
- There is no limit to the amount of PCB concentration in the waste that they can accept.
- They have direct rail access on-site and can accept gondola, truck, and intermodal containers.

Based on a conversation with a representative from Waste Control Specialists, their disposal facility in Andrews, TX is the only landfill in the country built and operated after the RCRA LDRs were put into effect. Reportedly, the landfill was designed and constructed with a RCRA/TSCA-approved, double-lined, leak detection, leachate collection and control system backed by both primary and secondary synthetic liner systems and redundant natural barriers. Because the facility was licensed after the LDRs were established and were therefore able to install the appropriate control systems, the facility can accept waste that has unlimited PCB concentrations when mixed with RCRA waste. The RCRA metals and RCRA organics, however, would still be subject to the treatment standards.

3.9. SUMMARY

Waste classification and acceptance criteria are large variables in selecting the appropriate disposal facility and subsequently the appropriate method of transportation for hauling the waste to the selected facility. In order to determine how much impact the disposal facility selection has on the costs of the various transportation methods, the volumes in Figure 4 were paired up with a likely disposal facility based on the acceptance criteria described above. Disposal facility options are an important factor in selecting the overall transportation method for the Site's Remedial Action (RA). Based on anticipated waste streams and the mode of transportation accepted at the researched facilities, it is likely that at least 20% of the waste will need to be shipped by some form of rail transportation. Table 3.0 summarizes the volumes shown on Figure 4 for each material classification, the disposal facilities that accept each classification and the overall percentage of off-site disposal volume that can be accepted at that facility.

Examination of Table 3.0 indicates that approximately 30% of the soil (TSCA/RCRA mixed material that contains PCBs > 1,000 ppm) could be expected to require shipment to Andrews, TX because Andrews accept mixed RCRA/TSCA waste with an unlimited PCB concentration.

TABLE 3.0

Volume Estimates and Potential Disposal Facilities

Waste Classification	TSCA, RCRA, Mixed (TSCA + RCRA) – meets LDRs	TSCA/RCRA mixed – does not meet LDRs for metals and organics (PCBs <1,000 ppm)	RCRA – does not meet LDRs for Metals	RCRA – does not meet the LDRs for Metals and Organics	TSCA/RCRA mixed – does not meet LDRs for metals and organics (PCBs > 1,000 ppm)	Approximate % of Waste Acceptable at Facility[1]
Estimated Volume (CY)	17,450	2,150	5,830	2,000	10,130	
Andrews, TX	√	√	√	√	√	100
Grandview, ID	√	√	√	√		73 (see notes)
Belleville, MI	√		√	√		67
Model City, NY	√		√	√		67
Emelle, AL	√		√	√		67
Arlington, OR	√	√	√	√		73
Grassy Mountain, UT	√		√			62
Beatty, NV	√	√	√	√		73

1. Based on estimated waste characterization/totals as evaluated in this FS Technical Memorandum;
2. √ - facility accepts waste classification
3. If variance described in Section 3.8 is granted, 100% would likely be accepted by Grandview, Idaho.

The first four disposal facilities listed in Table 3.0 are utilized in Section 4 (Transportation Comparison) because separate transportation costs were obtained for each facility. Separate transportation costs were not available for Emelle, AL; Arlington, OR; Grassy Mountain, UT; or Beatty, NV. While not used in the transportation evaluation, these disposal facilities remain options for disposal and should be considered when soliciting bids for T&D costs during the remedial bidding process.

In order to determine how disposal costs varied from facility to facility and how that variation can affect the overall T&D cost, disposal costs were obtained directly from the disposal facilities and are summarized in Table 4.0. All cost quotes obtained for this evaluation are represented as today's pricing and may change with time. However, for the purpose of this evaluation, transportation costs were separated from disposal costs to help determine if the capital construction cost per ton for the new rail spur would be less than truck dray costs per ton for intermodal rail transport and if both these options are less than directly trucking the material to a selected disposal facility. Due to the competitive nature of the T&D hazardous waste business, there are a few notable issues to consider when procuring of a T&D contract:

- Disposal costs vary from state to state due to state and local taxes; therefore, more competitive T&D pricing may be achieved if transportation for the waste is included in the disposal price directly from the facility. This is considered a "bundled" T&D price. Some facilities even expressed an interest in including the construction of an on-site rail spur in their bundled price, in order to leverage cost.
- Contractors often partner with transportation and railroad companies with pre-existing negotiated rates in order to create competitive pricing.
- The disposal cost with required pre-treatment can vary greatly and is based on the concentrations and constituents that exceed the LDRs. Therefore, a representative sample will need to be sent to target disposal facilities for complete analysis and evaluation of acceptance criteria and determination of total disposal cost.
- Cost savings that can be realized through the T&D process are not readily revealed during inquiries that are made as part of studies such as this T&D FS; therefore, the true T&D costs for this project will be understood only once the RA contractor begins the T&D procurement process.

Table 4.0 Waste Disposal Costs

Disposal Facility	Chemical Waste Management	EQ	Chemical Waste Management	Waste Control Specials	Clean Harbors	American Ecology	Chemical Waste Management
Location	Model City, NY	Belleville, Michigan	Emelle, Alabama	Andrews, Texas	Grassy Mountain, UT	Grand View, ID	Arlington, OR
Distance from Site	400	600	1100	1900	2257	2500	2800
Transportation Methods							
Gondola Rail Cars	N	Y - Transload Facility	Y - Transload Facility	Y - direct rail on site	Y - Transload Facility	Y - Transload Facility	Y - direct rail on site
Intermodal Containers	N (not currently)	Y	Y	Y	Y	Y	Y
Truck	Y (99.9% of deliveries)	Y	Y	Y	Y	Y	Y
Types of Waste Accepted **TSCA Waste**	$65/Ton ($106/ton for transportation)	$65.00	$65/Ton	$43/ton	(no pricing available)	$50/Ton	(no pricing available)
RCRA Waste	$65/Ton ($106/ton for transportation)	$65.00	$65/Ton	$43/ton	(no pricing available)	$50/Ton	(no pricing available)
RCRA Waste (with pre-treatment at disposal facility)	$125/Ton ($106/ton for transportation)	$95.00	$125/Ton	$150/ton	NA	$100/Ton	(no pricing available)
TSCA/RCRA Waste	$65/Ton ($106/ton for transportation)	$65.00	$65/Ton	$43/ton	(no pricing available)	$50/Ton	(no pricing available)
TSCA/RCRA Waste (with pre-treatment at disposal facility)	NA	NA	$125/ton	$150/ton	NA	$100/Ton	(no pricing available)
Contact	Pat Stauffer 716-754-0451	Mark Baron 716-901-3410	Polly Goodwin 205-652-8156	Tim Sweeney (972) 448-1463	Evan Altman 516-242-6347 Brian Towns 339-788-0871	Tim Curtain 973-694-7525	

4.0 TRANSPORTATION COMPARISON

4.1. TRANSPORTATION BY RAIL

Rail service is provided by six major, Class 1 railroads in North America. CSX and Norfolk Southern service the East Coast, Burlington Northern Sante Fe (BNSF) and Union Pacific service the West Coast, and Canadian National and Canadian Pacific service Canada. In addition to the major service lines, there are regional railroads such as Conrail that are considered "switching railroads". These regional railroads coordinate with the major railroads to move goods from locations off their major lines onto their service lines which allow them to efficiently transport goods across the country.

The rail line adjacent to the Site is operated by Conrail. CSX and Norfolk Southern jointly own Conrail. Therefore, any rail service from the Site would involve Conrail moving rail cars from the Site to either a CSX or Norfolk Southern service line. There are two types of transportation by rail being considered in this study: direct rail transportation with on-Site rail access and intermodal transportation (truck to rail) with front trucking "dray" costs included. The following paragraphs describe methods of rail transportation and provide estimated costs for each.

4.1.1. Direct Rail Transportation

Direct rail transportation refers to direct rail access on-site. The assumed shipping container is a standard gondola car, 57-ft long, with a maximum 110-ton shipping capacity. An average 107-ton shipping capacity will be used for all cost estimates. Direct rail assumes gondola rail cars are delivered and removed from the Site via a rail spur to be constructed for the project. Capital costs associated with construction of the rail spur include: rail spur design and bidding, a turnout and side track agreement with Conrail, and construction cost for the spur. A representative from CSX visited the Site and evaluated the feasibility of constructing a turnout from the adjacent rail line and a connecting rail spur on-Site to tie into the adjacent line. Based on meetings and multiple discussions with CSX, a turnout and side track agreement with Conrail is feasible. Attached in Appendix A is a copy of the Sidetrack Agreement form and guidelines for the design package required for approval of the Sidetrack Agreement by Conrail. If transportation by direct rail is selected as the transportation method for the Site, the next step would be to prepare and submit a design to Conrail for a side track agreement. Planning and construction of a new rail spur on-site may take approximately eight months. The following schedule is a possible scenario if direct rail is selected as the transportation method most beneficial for the Site:

Activity	Estimated Completion Date
Select Direct Rail for Transportation Method	May 2006
Submittal of Side Track Agreement Form and 35% Rail Design to Conrail by Malcolm Pirnie/USACE	August 2006
Selection of RA Contractor by USACE and assumption of rail design by RA Contractor	September 2006
Negotiations with Conrail and 65% Rail Design by RA Contractor/USACE	November 2006
Final Agreement with Conrail	January 2007
RA Contractor finalizes rail design; begins procurement of rail construction contractor	March 2007
Contract Award for Rail Spur Construction	May 2007
Start of Construction for Rail Spur	July 2007
Complete Construction of rail spur	August 2007

The following paragraphs break down the assumptions made for the cost estimate for transportation by direct rail on-site. In order to determine what length of rail spur will be needed, an estimated daily T&D rate was calculated using the following working assumptions:

- No major delays in soil production once excavation begins
- 50 working weeks per year, 5 days a week
- 107 Ton weight capacity per gondola car
- Length of gondola car = 57 feet
- In place soil density of 110 psf; 1.5 conversion factor from in place cubic yards to tons (37,560CY x 1.5 tons/CY = 56,340 tons = ~ 56,500 tons)

Assuming all 56,500 tons are shipped off-site by rail, the number of cars needed will be approximately 530 rail cars. Assuming excavation will require 4 years to complete, the number of rail cars per year would be approximately 133 rail cars. Over roughly 50 weeks in a year, the average rail car load out schedule would come to approximately 3 rail cars per week over the course of four years. However, based on previous projects with on-site rail access, load-out and transportation activities are most efficiently performed in weekly segments of full-time load-out operations, up to 5 rail cars a day. This approach could be recognized by stockpiling excavated material between transportation events. Therefore, in order to support this short term daily load-out rate with an empty rail car capacity of 10 rail cars, approximately 900 linear feet of spur (15 rail cars x 57-feet/rail car = 855 linear feet) would be needed. This estimated rail car capacity is assumed for maintaining adequate productivity and schedule in case the railroad company cannot commit to a twice a day switch out. An additional 500 linear feet would likely be added for access, switches, storage, and miscellaneous capacity for tracking rail cars, totaling 1400 linear feet (L.F.) of track. (Note: Based on final volume calculations to be performed for the remedial design, this linear track estimate will have to be re-evaluated during design.

The following assumptions were made to estimate the capital cost for constructing 1400 L.F of rail spur:

- Cost per L.F of installed track - estimate from local railroad construction company-$125/L.F. x 1400 L.F. = $175,000
- Cost per installed turnout by Conrail = $150,000 (estimate from representative from CSX)

- Cost to design and bid construction of the rail spur was estimated to be approximately 15% of the total construction cost = $50,000.
- A cost contingency of 40% was added to cover any Site improvements needed to install the rail spur and turn out such as site grading and construction of a bulk head.

A transshipment area for soil stockpiles and debris segregation is assumed to be the standard site operation and universal for each transportation option being considered. Therefore, costs associated with site improvements for transshipment are not factored into the transportation comparison.

The total estimated capital cost for building the rail spur is approximately $525,000. Assuming all soil will be shipped by rail, the average capital cost per ton is $525,000/56,500 tons = approximately $10/ton. The volume shipped will cause variance in this cost/ton estimate. For example if the actual volume shipped is closer to the original ROD volume of 92,000 in place cubic yards (this assumes that approximately 15% of 107,000 in place cubic yards estimated in the ROD will be re-used on-site for backfill and the rest will be shipped off-site for disposal), the capital cost for the rail spur would reduce to approximately $4/ton ($525,000/138,000 tons). In comparison, if all treated soil can be used as backfill on-site regardless of its RCRA characteristics, the estimated disposal volume would reduce to 53,500 in place cubic yards or approximately 80,250 tons which would result in a capital cost of almost $7/ton. Therefore, the potential range for the rail capital cost per ton is from $10/ton to $4/ton. For the purpose of this T&D evaluation, however, the lower volume assumption and higher capital cost per ton at $10/ton is utilized.

Direct rail transportation cost estimates for four out of the five disposal facilities are summarized in Section 4.1.3. The $10/ton capital cost is added to the transportation costs to estimate an overall "$/ton transportation only" price to compare to the other transportation options. The transportation cost for the gondola rail car shipped from the Site to a particular disposal facility is summarized in Table 5.0. This price assumes an 18 mil liner, tracking of the cars for proper loading, and an estimated fuel surcharge of 18%.

4.1.2. Intermodal Transportation – Truck to Rail

Intermodal rail transportation is another option for the Site and involves either trucking the waste from the Site by intermodal containers or dump trailers to a rail service terminal/transload facility for rail shipment. The trucking cost associated with this portion of the intermodal options is referred to as "front dray" cost. The cost associated with hauling the waste from the transload facility owned by the disposal facility is referred to as "rear dray" and is typically included in the disposal price offered by the facility. The front dray cost estimates obtained from a transportation company represent March 2006 pricing. Since intermodal rail transport requires Site access for trucks and potential trucking routes, the Borough of South Plainfield and the local Police Department were contacted for information. The findings are included in Section 4.2.

Intermodal containers have a maximum shipping capacity of 24 tons. Actual shipping load typically averages 22 tons/intermodal container. They are delivered by truck, dropped off for loading, and then picked up for delivery to a transload terminal where they are loaded onto a flat bed rail car. A flat bed rail car typically has the capacity to haul 6 intermodal containers, approximately 130 tons. The front dray cost for intermodal shipment varies with construction schedules, demurrage fees, fuel surcharge costs, local and state taxes, efficiency in loading, intermodal availability and construction related delays, if any. A transportation company handling similar projects in the area with similar waste classifications estimated the dray cost to be $32/ton. This cost includes providing the intermodal containers, hauling the waste to the transfer terminal (price assumes the terminal is located in New Jersey), loading the intermodal on the flatbed rail car and preparing it for shipment. This cost assumes union/prevailing wage labor rates and an 18% fuel surcharge. The transportation cost for shipped flatbed railcar shipped from the transload facility to the listed disposal facility is summarized in Table 5.0; this price includes an 18 mil liner, tracking of the cars for proper loading, and a long-term negotiated fuel surcharge rate less than 18%.

The second intermodal method considered involves using dump trailers to load the waste on-site and haul it to a regulated and secure transload facility to have the waste transferred into a gondola rail car for rail shipment. This option requires double handling of the waste from one container to another and a regulated facility that allows this hazardous waste handling. According to one transportation company and one T&D broker we contacted, there are only three permitted transload facilities some what proximate to the Site that would allow this type of operation; therefore, this operation has potential limitations based on availability. For the transportation company contacted, based on previous projects in the area with similar waste classifications, an estimated trucking dray cost to a permitted transload facility approximately 30 miles away is estimated to be $25/ton. This cost includes providing the dump trailers, hauling the waste to the transfer station in New Jersey, transferring the waste from the dump trailer to a gondola rail car with union/prevailing wage labor rates, and an estimated 18% fuel surcharge. The transportation cost of shipping the gondola rail car from the transload facility to the listed disposal facility is summarized in Table 5.0; this price includes an 18 mil liner, tracking of the cars for proper loading, and a long-term negotiated fuel surcharge rate less than 18%.

4.1.3. Summary of Transportation Costs for Rail Options

Table 5.0 summarizes the estimated rail transportation costs to three disposal facilities for the identified rail options, to calculate and compare each option in $/ton/mile. Rail access is currently not available at Model City, NY and therefore is not included.

TABLE 5.0

Summary of Transportation Costs by Rail ($/ton)

Rail Transportation Mode	Romulus, MI = 600 miles			
	$/Rail Car	Trucking Front Dray ($/ton)	Rail Capital Cost ($/ton)	Total Cost ($/ton)
Direct Rail – (assumes use of privately owned rail cars)	$7,700.00	N/A	$10.00	$81.96
Intermodal – Dump Trailer to Gondola	$6,325.00	$25.00	N/A	$84.11
Intermodal – Container to Flatbed Rail Car	$7,900.00	$32.00	N/A	$92.77
Rail Transportation Mode	Andrews, TX -1900 miles			
	$/Rail Car	Trucking Front Dray ($/ton)	Rail Capital Cost ($/ton)	Total Cost ($/ton)
Direct Rail – (assumes use of privately owned rail cars)	$14,650.00	N/A	$10.00	$146.92
Intermodal – Dump Trailer to Gondola	$11,900.00	$25.00	N/A	$136.21
Intermodal – Container to Flatbed Rail Car	$14,000.00	$32.00	N/A	$139.69
Rail Transportation Mode	Grandview, ID = 2500 miles			
	$/Rail Car	Trucking Front Dray ($/ton)	Capital Cost ($/ton)	Total Cost ($/ton)
Direct Rail – (assumes use of privately owned rail cars)	$13,500.00	N/A	$10.00	$136.17
Intermodal – Dump Trailer to Gondola	$10,900.00	$25.00	N/A	$126.87
Intermodal – Container to Flatbed Rail Car	$13,000.00	$32.00	N/A	$132.33

The costs in Table 5.0 are plotted on Figure 6. Review of Figure 6.0 indicates, based on quotes from one particular transportation company, that direct rail is the most cost effective of the three rail options within approximately 600 miles of the Site. Beyond 600 miles, intermodal transportation by way of dump truck and gondola is the most cost effective of the three rail options. Beyond 1,100 miles from the Site, both intermodal options (dump trailer/gondola car and intermodal container/flatbed car) are more cost effective than direct rail. These inflection points illustrate the effect of pre-existing negotiated contracts and how they can provide competitive pricing. These results represent pricing from one prospective transportation contractor with pre-existing negotiated fuel surcharge rates which is why the price for shipping a gondola car from their transload facility is less than shipping it directly from site. A new rail spur constructed on-site will most likely be considered a "new haul location" and will be subject to current fuel surcharge rates (estimated at 18%) rather than an existing haul location that may have a locked in low fuel surcharge rate under an existing agreement. However, the competitive nature of the T&D industry may reveal a bid structure that eliminates the seeming cost benefit of intermodal transport shown here.

4.2. TRANSPORTATION BY TRUCKING

Trucking the waste directly from the Site straight to the disposal facility was also evaluated. Direct trucking includes directly loading waste into 24-ton shipping capacity trucks on-site and then trucking it on interstate highways to the selected disposal facility. The average daily production rate of trucks to haul all 56,500 tons of waste with a trucking capacity of 24 tons is estimated to be 3 trucks per day over the course of 4 years. (56,500 tons/24 tons/truck = 2354 trucks/4 years = 589 trucks/year/50 weeks/year = 12 trucks a week or up to 3 trucks a day) trucked off-site. Again, this is based on a much lower assumed volume than that originally assumed in the ROD.

Access to and from the Site will depend on the approval from the Borough council. The Borough of South Plainfield indicated that Market Avenue had been temporarily designated as a truck route during the construction on Hamilton Avenue and the feasibility of allowing New Market Avenue to remain a truck route following construction is currently under review. Therefore, assuming New Market Avenue will be designated a permanent trucking route; the suggested route from 333 Hamilton Boulevard to Route 287 is the following:

- West on New Market Avenue for approximately 1 mile
- Left on South Clinton Avenue for approximately 2 miles
- Right onto Route 603 for approximately 0.5 miles
- Left onto Route 529 for approximately 0.25 miles
- Left onto the appropriate entrance ramp to access either 287N or 287S

If New Market Avenue is not authorized for truck traffic, either Hamilton Boulevard or alternate routes will need to be considered and approved by the Borough for truck access to and from the Site. Weight limitations of these alternate routes have not been evaluated as part of this study.

4.2.1. Trucking Cost Basis

For this study, an average \$0.24/ton/mile is used for trucking cost based on an informal quote of \$100/ton received from a transportation broker and the Waste Management Disposal Facility at Model City, NY for transportation from the Site up to Model City, NY for disposal. A typical capacity of 24 tons per truck is assumed which yields the following cost: \$100/ton/410 miles = \$0.24/ton/mile.

4.3. TRANSPORTATION AND DISPOSAL COST COMPARISON

Table 6.0 summarizes transportation costs to four potential disposal facilities for each rail option plus the cost for direct trucking of the waste. Figure 7.0 graphically compares the costs \$/ton/mile. The comparison show that based on the quotes obtained in this study for transportation cost only, direct trucking is only cost effective within approximately 100 miles from the Site (point A) and beyond 250 miles all three rail options are more cost effective than direct trucking. The comparison between each of the rail options remains the same as shown on Figure 6.0.

TABLE 6.0

Summary of Transportation Costs ($/ton)

Highway Miles to Disposal Facility	Truck	Direct Rail (assume private)	Intermodal Container to Rail	Dump Trailer to Rail
	$/ton	$/ton	$/ton	$/ton
Model City, NY = 400	100			
Belleville, MI = 600	144	82	93	84
Andrews TX = 1900	456	147	140	136
Grandview, ID = 2500	600	136	132	127

As discussed in Section 3.0, disposal costs vary from state to state and can significantly affect the overall T&D cost ($/ton). By adding the disposal cost from Table 4.0, we arrive at an estimated overall T&D cost summarized in Table 7.0 based on all the quotes obtained in this study.

TABLE 7.0

Summary of Transportation and Disposal Costs ($/ton)

Highway Miles to Disposal Facility	Disposal Cost ($/ton)	Truck	T&D Direct Rail (assume private)	T&D Intermodal Container to Rail	T&D Dump Trailer to Rail
	$/ton	$/ton	$/ton	$/ton	$/ton
Model City, NY = 400	65	165			
Belleville, MI = 600	65	209	147	158	149
Andrews TX = 1900	40	496	187	180	176
Grandview, ID = 2500	50	650	186	182	177

5.0 ADVANTAGES AND DISADVANTAGES OF TRANSPORTATION OPTIONS

5.1. DIRECT RAIL

The following section summarizes the advantages and disadvantages of constructing a new rail spur to provide direct access for gondola rail car shipment to a selected disposal facility from the Site.

Advantages:

- Based on the assumptions utilized for this study, capital costs required for direct rail implementation adds approximately $10/ton to the T&D cost; greater volumes of soil will effectively decrease this cost per ton capital cost. This additional capital cost is relatively small compared to typical trucking dray costs and other fees associated with multiple waste handling.
- The capital cost ($525,000) to build the new rail spur may add future re-development value to the site depending on future land use decisions.
- Minimal impact to local truck traffic which minimizes impacts to surrounding residents due to traffic, air/dust, and noise nuisances.
- U.S. Ecology in Idaho as well as Grassy Mountain, UT offered to provide a "bundled" price which would include the rail spur construction plus transportation and disposal fees; contractor should evaluate these options during the T&D procurement.
- Potential for cost savings on direct transportation negotiating power with CSX or Norfolk Southern.

Disadvantages:

- Coordination with Conrail for a side track agreement can be time consuming and cause schedule delays.
- Coordination with rail car delivery and pick up can be challenging to manage during operations; use of a single T&D subcontractor coordinator is recommended.
- Design of rail spur alignment and loading bulk head are crucial to efficient site operations. It would be essential to start the design process as soon as possible and to transition to a RA contractor-lead T&D design

procurement process during the overall soil remedial design. An additional geotechnical investigation will need to be implemented to obtain design data.

- A new rail spur would be considered a "new haul" to the railroads and therefore, the Project may not benefit from any long term pre-negotiated fuel surcharge rates. Effective negotiations by the RA contractor could help to minimize this impact.
- Need to coordinate rail alignment with building demolition and soils removal activities. Rail alignment over existing PCB contamination > 500 ppm would require either preliminary excavation or rail movement prior to completion of remedial action. Furthermore, an elevation differential of 3 to 5 feet exists between the existing Conrail lines and the Site; excavation /stockpiling of this soil, some of which may be contaminated, would need to be addressed as well.

5.2. INTERMODAL TRANSPORTATION

The following section summarizes the advantages and disadvantages of using intermodal transportation for the Site material by combining truck and rail to transport material from the Site. Two intermodal methods were evaluated: intermodal containers hauled by truck to a transload facility onto flat rail cars for shipment, and dump trailers hauling material to a permitted transload facility for direct material loading into a gondola car for shipment.

5.2.1. Intermodal Containers and Flatbed Rail Cars

Advantages:

- A rail spur does not need to be constructed, therefore scheduling and coordination of the design, construction, and use of the rail spur on Site is not an issue.
- Several transload facilities owned by both private transportation companies and the two major railroad lines, CSX and Norfolk Southern, are located within 50 miles of the Site.
- Intermodal containers are completely contained. They provide a "cleaner" operation then dump trucks or dump trailers with less potential for spills and releases.

- Potential to benefit from long-term negotiated fuel costs with an established private transload facility.

Disadvantages:

- Front trucking and handling dray costs are approximately $32/ton.
- Potential for impacts to the surrounding areas/residents from hauling the intermodals off-site to the transfer facility such as traffic, air/dust, and noise nuisances.
- Availability of intermodal containers and flatbed shipping rail cars is more constrained then standard gondola cars.

5.2.2. Dump Trailers and Gondola

Advantages:

- A rail spur does not need to be constructed on-site, therefore scheduling and coordination of the design, construction, and use of the rail spur on site is not an issue.
- Potential to benefit from long-term negotiated fuel costs with an established transload or terminal facility.

Disadvantages:

- Few options for permitted transload facilities in the area (possibly only three) that can handle hazardous waste and transfer it into a gondola
- Front trucking and handling dray cost is $25/ton.
- Open truck needs to be secured (i.e., tarp).
- Potential for impacts to the surrounding areas from hauling the intermodals off-site to the transfer facility such as traffic, air/dust, and noise nuisances.

5.3. TRUCKING

The following paragraphs list the advantages and disadvantages to direct trucking transportation:

Advantages:

- Based on the assumptions, trucking to a facility within ~100 miles of the Site is a cost effective transportation method.
- A rail spur does not need to be constructed on-site, therefore scheduling and coordination of the design, construction, and use of the rail spur on site is not an issue.
- Trucks are readily available and have no identified scheduling impact at this time.

Disadvantages:

- The closest disposal facility is 400 miles from the site – not within the calculated cost effective 100 mile radius.
- It is likely that not all the waste can be shipped to Model City, NY. A second transportation method (i.e., intermodal) will need to be implemented and several disposal facilities will need to be used.
- Potential for impacts to the surrounding areas from trucking on local roads such as traffic, air/dust, and noise nuisances.
- Higher potential for accidents and spills over long trucking distances compared to other alternatives.
- Open truck needs to be secured (i.e., tarps).

6.0 CONCLUSIONS AND RECOMMENDATIONS

In this T&D evaluation, four separate methods of transporting material from the Site for off-site disposal to a permitted facility have been considered:

- Direct rail transportation from the Site through the use of gondola rail cars.
- Intermodal transportation from truck to rail through the use of intermodal containers trucks and flatbed rail cars.
- Intermodal transportation from truck to rail through the use of dump trailers and gondola rail cars, and
- Direct trucking from the Site through the use of 24-ton trucks.

Disposal volumes utilized are conservative estimates based on preliminary re-evaluation of RI/FS data. Implementation of the PDI program will results in more accurate volumes. Building debris volumes have not been utilized in this evaluation.

Based on pricing received from transportation brokers, one transportation company, and waste disposal facilities, and assumptions made on the capital cost per ton for construction of a new rail spur, the study indicates that:

- Direct trucking is the least expensive option within 100 miles of the Site.
- Direct rail is least expensive within approximately 100 to 600 miles of the Site.
- Intermodal transportation by way of dump truck and gondola rail car is most cost effective beyond 600 miles, and
- Both intermodal options are more cost effective than direct rail beyond 1,100 miles from the site.

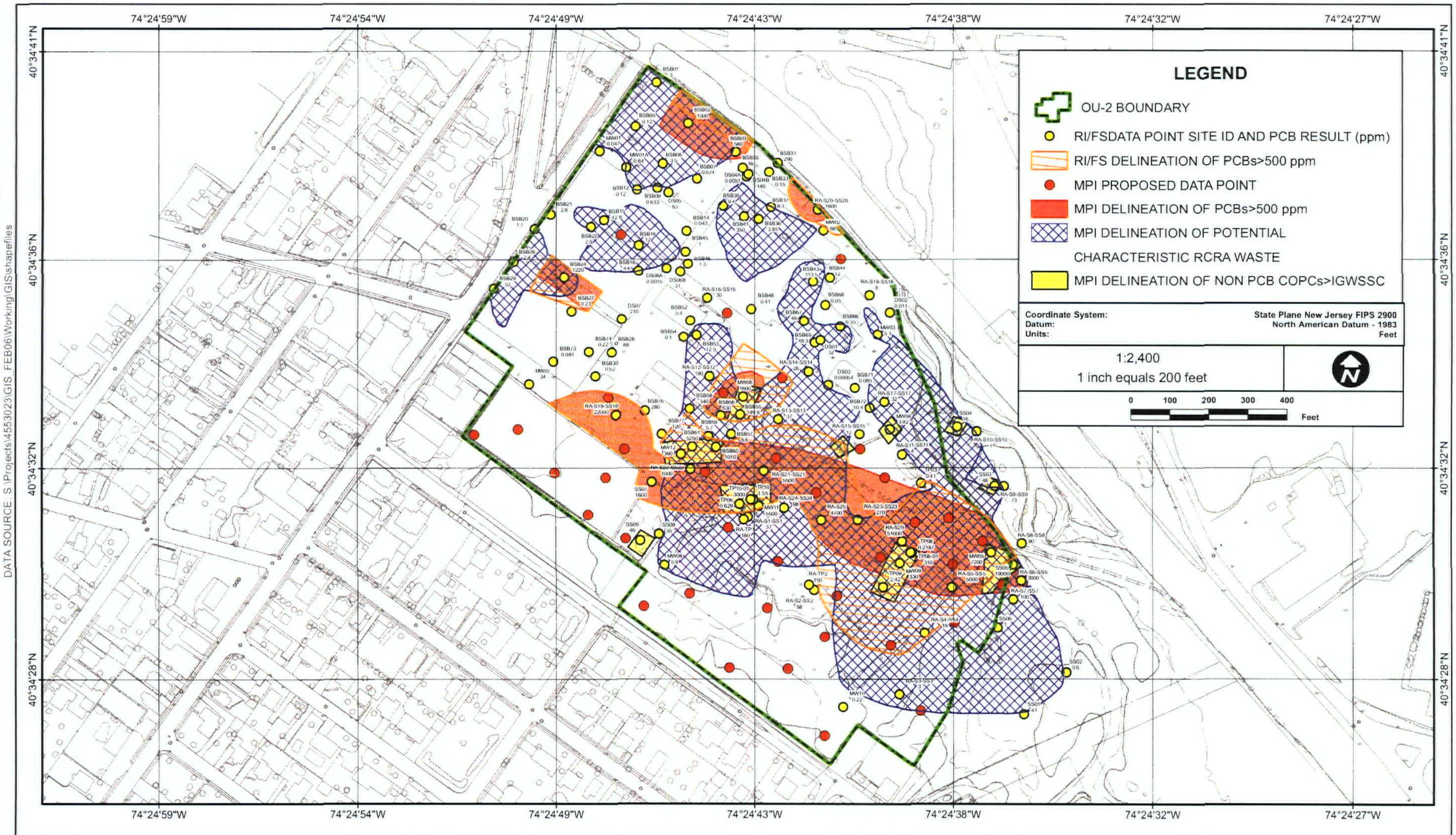
At this time, with the data collected as part of the T&D evaluation and considering the EPA's commitment to the public to minimize project impact to the surrounding residents, it appears that the most feasible approach to transportation of the waste off-site would be via direct rail. We make the following recommendation to move the project forward:

1. Soil volumes are questionable at this time due to data gaps in the RI/FS data. Accordingly, the proposed PDI program needs to be implemented and a refined volume of contaminated material calculated. Waste should be further classified as TSCA, RCRA, or TSCA/RCRA mixed. Once the refined volumes are calculated, a better estimate of appropriate disposal facilities can be made. Distance and accepted mode of transport at each facility weigh heavily in the T&D selection.
2. Disposal options for material treated on-site using LTTD to a PCB concentration < 10 ppm need to be fully addressed. If the treated material is determined to be RCRA characteristic waste, a determination must be made whether the material can be reused on-site or whether off-site disposal is required. Off-site disposal quantities will likely be significantly affected by this determination.
3. On a pure cost basis, intermodal transport appears to offer the most viable options for off-site transport when considering long distance hauling that will likely be required. However, the cost differential when compared with direct rail is less than 10% (for the 900 and 2500 mile hauling distances evaluated here; direct rail is actually cost effective for the 600 mile hauling distance). Increased soil volumes requiring off-site disposal will reduce the capital costs of rail construction on a per ton basis, reducing the cost differential even more. Intangible benefits (i.e., elimination of additional truck traffic in the neighborhood and potential quality of life impacts) need to be considered heavily in the decision process.
4. The T&D industry is highly cost competitive. The benefits to be recognized, however, will only be revealed once the T&D procurement process is underway. During study phases, information gathered should be considered approximate at best; RA contractors will be in a better position to negotiate rates that could result in true cost savings and identify the most cost effective solutions. Therefore, the RA contractor should be engaged as soon as practical to ensure timely T&D procurement.
5. The cost for design and construction of an on-site rail spur is relatively minor when compared with the overall T&D costs (~$525,000 vs. ~$7M to $10M). Because of the potential budgetary timeframe that may be required for the design and construction of the spur, it is recommended that the 35% design be commenced as soon as possible, even if the final transport made is not yet selected. This would enable Conrail to be involved at an early date and minimize potential schedule impacts. It is

also recommended that the design be transferred to the RA contractor once the RA contractor is selected such that it can proceed as design-build thereafter. Should the ultimate decision be made by the EPA to utilize a transport option other than direct rail, then the outlay of rail design costs would have been minimal.

6. Bid multiple alternatives for T&D disposal and include the design and construction cost of the RR spur in the price of any rail alternative that would access the site directly for shipment.

FIGURES



MALCOLM PIRNIE

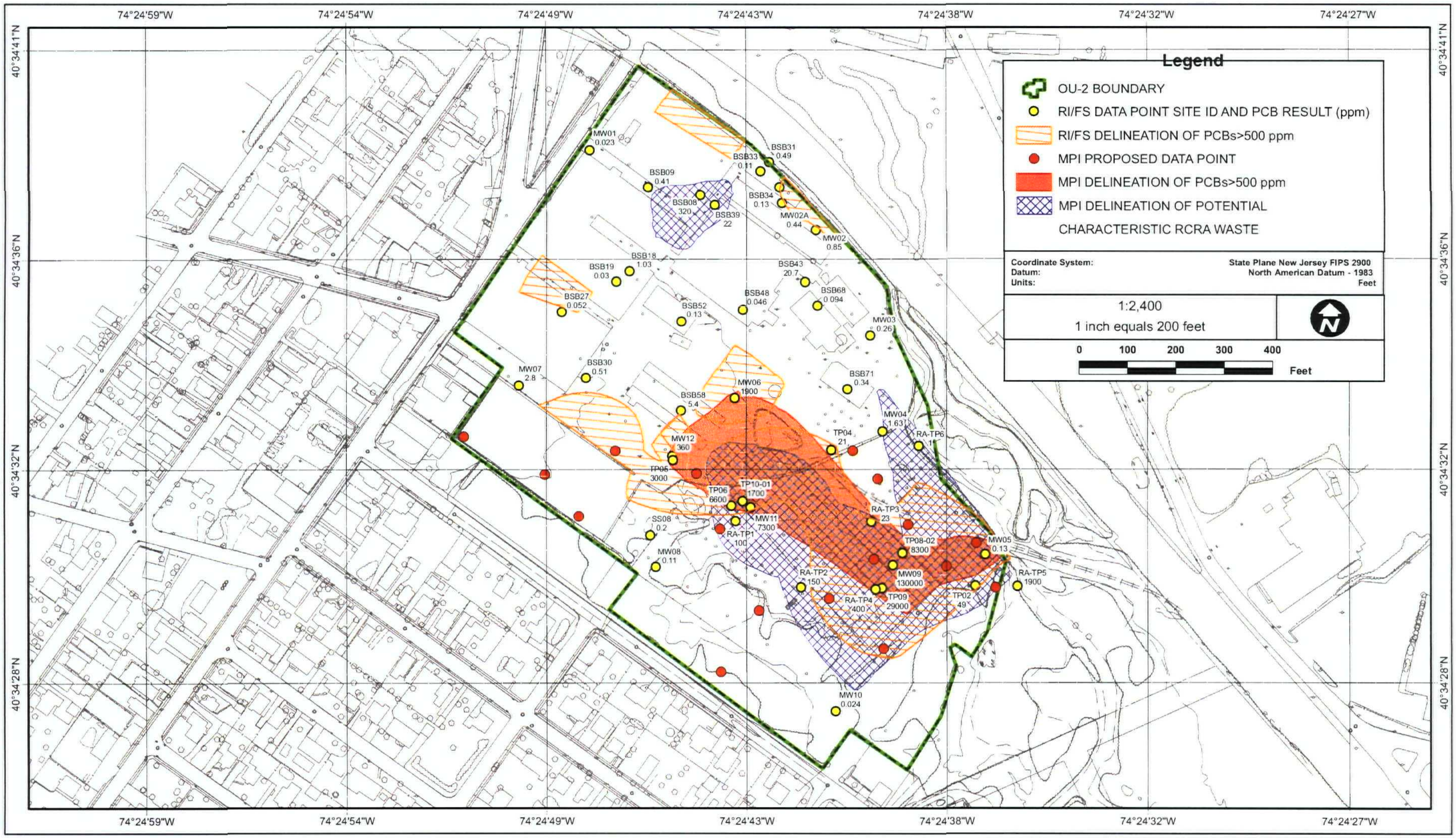
CORNELL- DUBILIER ELECTRONICS
SUPERFUND SITE
SOUTH PLAINFIELD, NEW JERSEY

PRELIMINARY VOLUME ESTIMATES

ESTIMATED HORIZONTAL EXTENT OF CONTAMINATION

RI Data Points 0'-2' Depth BGS

FIGURE 1



MALCOLM PIRNIE

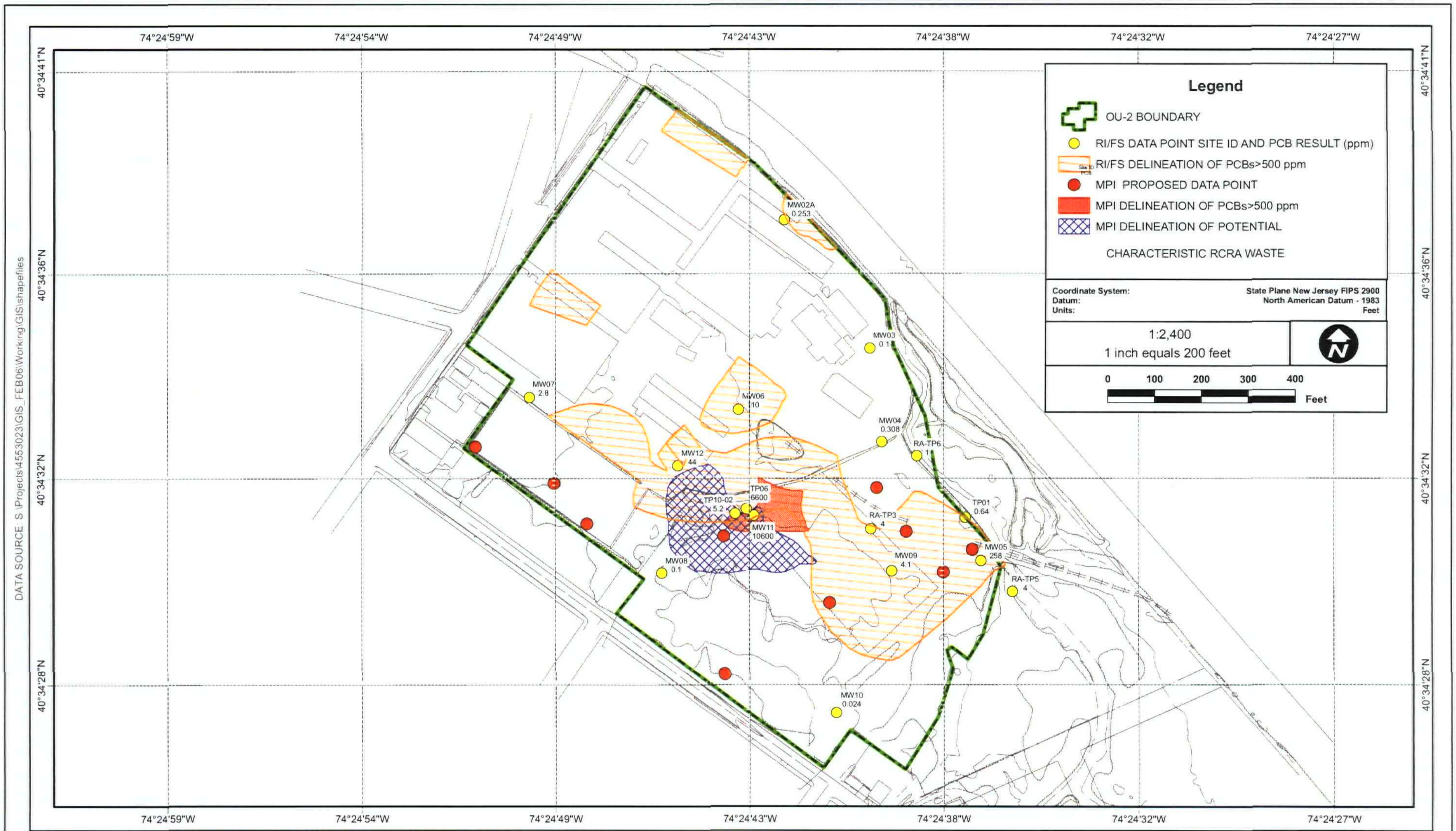
CORNELL- DUBILIER ELECTRONICS
SUPERFUND SITE
SOUTH PLAINFIELD, NEW JERSEY

PRELIMINARY VOLUME ESTIMATES

ESTIMATED HORIZONTAL EXTENT OF CONTAMINATION

RI Data Points 2' - 6' Depth

FIGURE 2



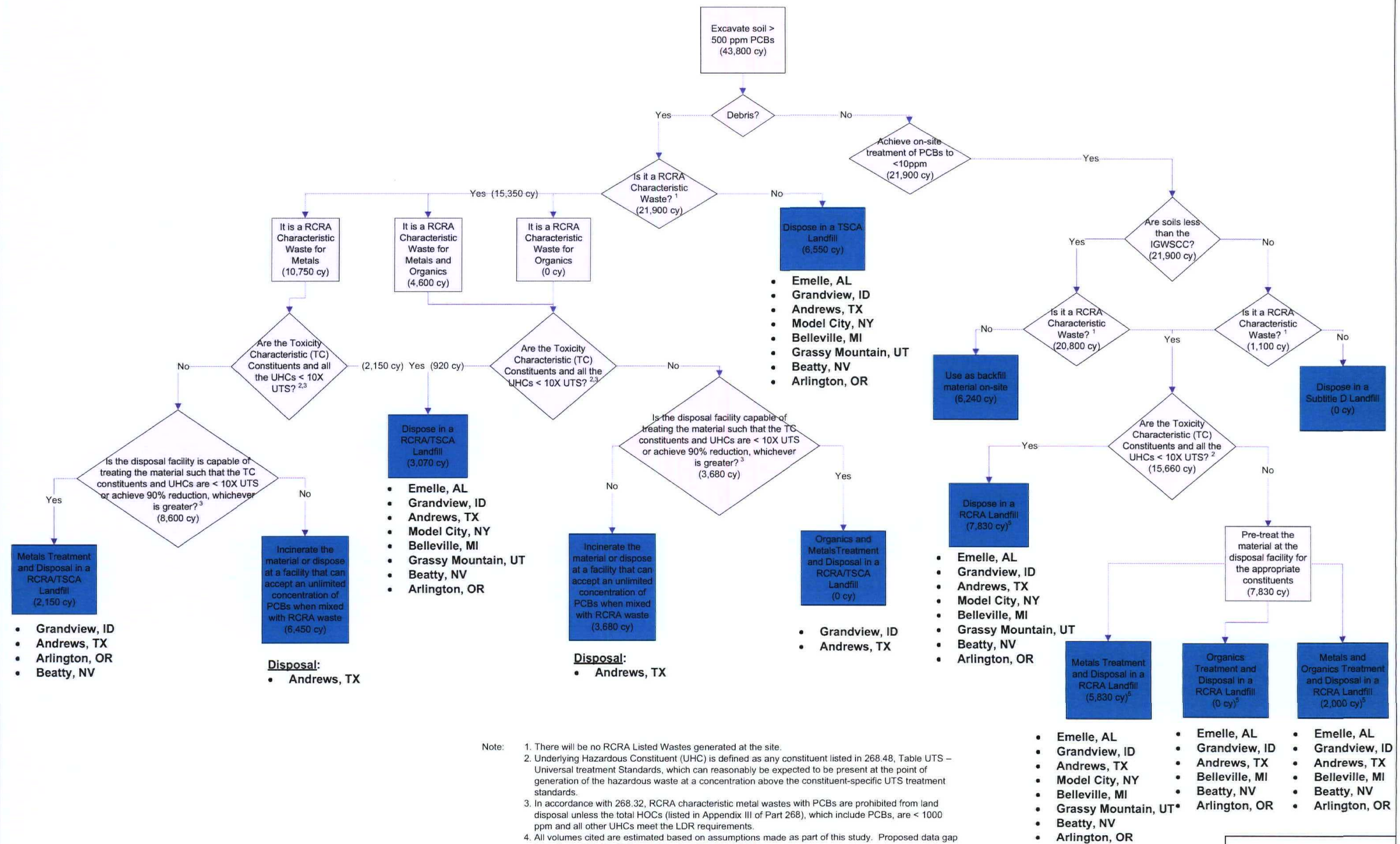
MALCOLM PIRNIE

CORNELL- DUBILIER ELECTRONICS
SUPERFUND SITE
SOUTH PLAINFIELD, NEW JERSEY

PRELIMINARY VOLUME ESTIMATES

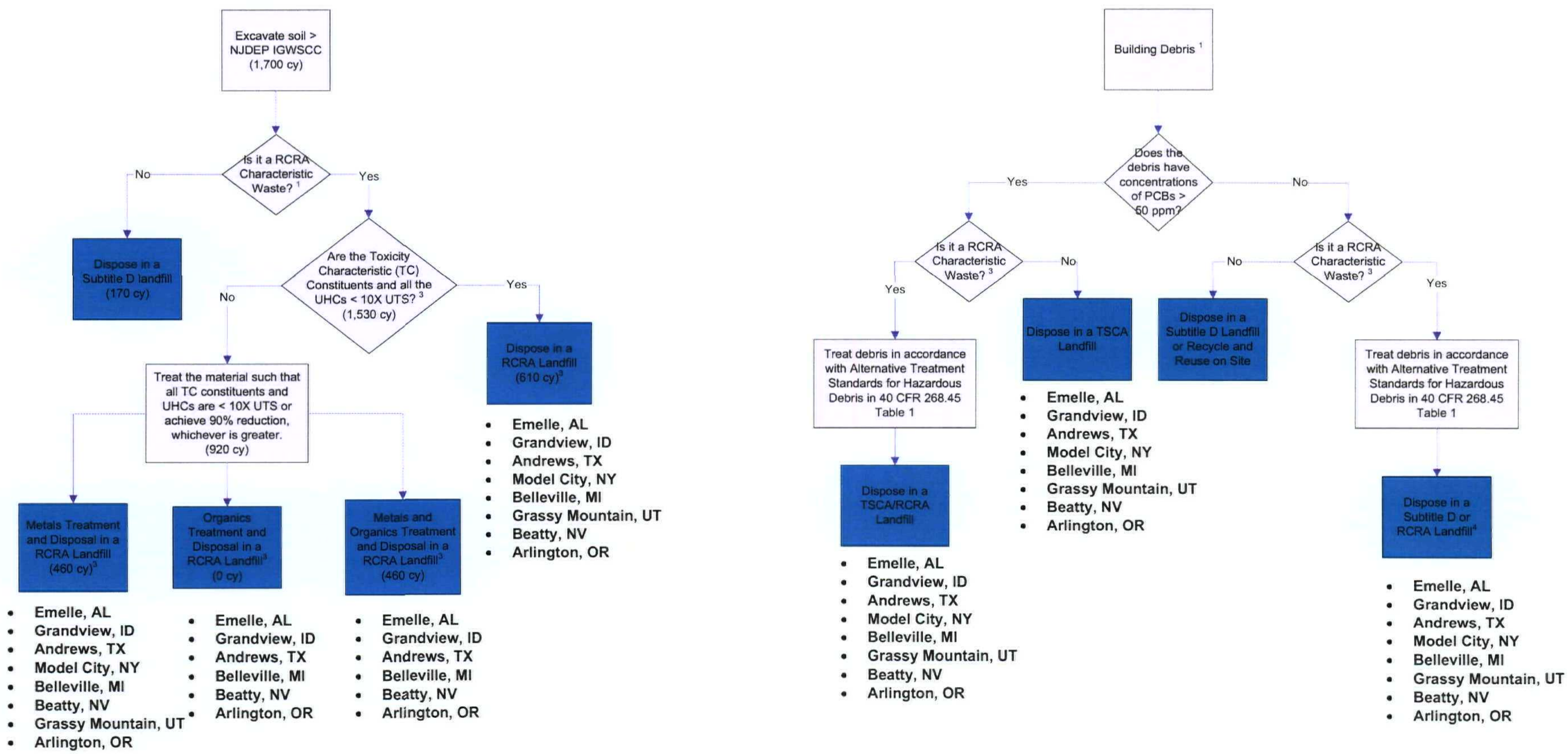
ESTIMATED HORIZONTAL EXTENT OF SITE CONTAMINATION

RI Data Points 6' - 14' Depth
FIGURE 3



Note:
1. There will be no RCRA Listed Wastes generated at the site.
2. Underlying Hazardous Constituent (UHC) is defined as any constituent listed in 268.48, Table UTS – Universal treatment Standards, which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards.
3. In accordance with 268.32, RCRA characteristic metal wastes with PCBs are prohibited from land disposal unless the total HOCs (listed in Appendix III of Part 268), which include PCBs, are < 1000 ppm and all other UHCs meet the LDR requirements.
4. All volumes cited are estimated based on assumptions made as part of this study. Proposed data gap sampling under the PDI program will refine these totals.
5. Only Subtitle C landfills with a TSCA permit are listed here.

Figure 4



Note:
1. There will be no RCRA Listed Wastes generated at the site.
2. Underlying Hazardous Constituent (UHC) is defined as any constituent listed in 268.48, Table UTS – Universal treatment Standards, which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards.
3. Only Subtitle C landfills with a TSCA permit are listed here.
4. All volumes cited are estimated based on assumptions made as part of this study. Proposed data gap sampling under the PDI program will refine these totals.

Note:
1. Different facilities have different debris sizing requirements for landfill disposal and treatments options. Although building debris was not considered in the T&D project evaluation, this flow chart is presented for informational purposes.
2. The Underlying Hazardous Constituents (UHC) treatment requirements do not apply to debris.
3. There will be no RCRA Listed Wastes generated at the site.
4. Only Subtitle C landfills with a TSCA permit are listed here.

Figure 5

Figure 6.0 - Transportation Cost Comparison for Rail Options ($/ton)

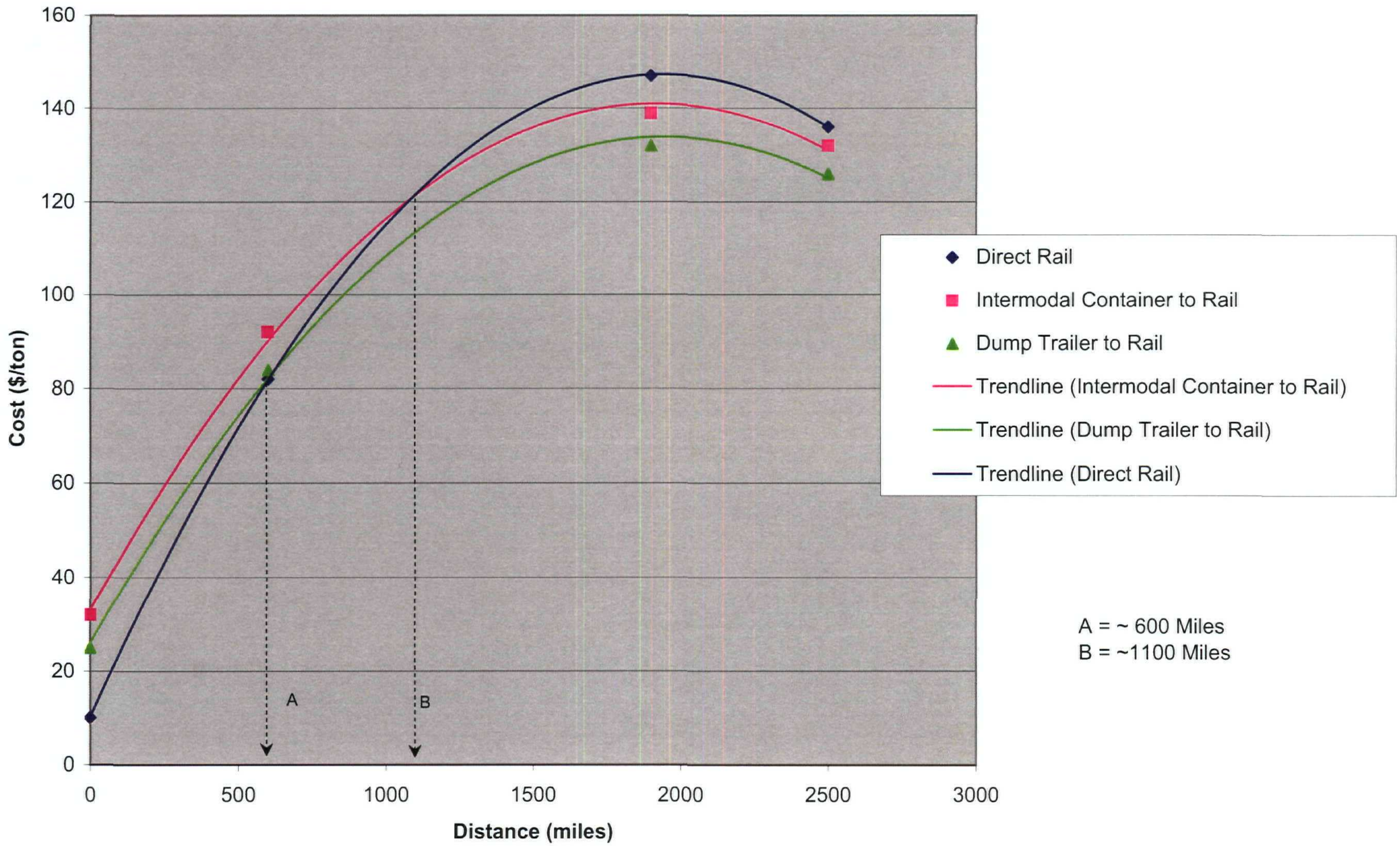


Figure 7.0 - Summary of Transportation Cost for All Options ($/ton)